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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,182	02/25/2004	Curtis James Miller	2-1	3691

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Ryan, Mason & Lewis, LLP
90 Forest Avenue
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EXAMINER

SARKAR, ASOK K

ART UNIT PAPER NUMBER

2891

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EF

Office Action Summary	Application No. 10/786,182	Applicant(s) MILLER ET AL.	
	Examiner Asok K. Sarkar	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 22 and 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/9/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I claims 1 – 21 in the reply filed on October 13, 2005 is acknowledged. The traversal is on the ground(s) that that the process set forth in claim 1 cannot be practiced by hand without a specialized apparatus. Claim 1 specifically recites the utilization of a bonding tool for performing wire-bonding operations in an integrated circuit. Further, as is commonly known in the art due to the extremely small tolerances involved in wire – bonding operations of an integrated circuit, it is not possible to perform such a wire – bonding process by hand without the need for a specialized apparatus. This is not found persuasive because the Apparatus in question includes other components in addition to the bonding tool. Although, the bonding tool is needed, as alleged, the bonding tool can be operated by hand without the other components. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

3. Claims 1 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation that at least two wire bond profiles in

the integrated circuit are substantially perpendicular to one another at a crossing point of the profiles is indefinite because the claims do not provide either any orientation of the two bonding sites with respect to the package or the viewing angle with respect to the die and the bonding sites. The presence of unclear limitation within a claim renders the claim indefinite. For examination purposes, the above limitation was taken to be that of two wires crossing when viewed from any side.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 and 16 – 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang, US 2004/0124545.

Regarding claim 1, Wang teaches a method for performing a wire – bonding operation in an integrated circuit, utilizing a bonding tool, the method comprising the steps of:

- ball bonding a wire to a first bond site in the integrated circuit;
 - forming at least one bend in the wire; and
 - terminating the wire at a second bond site, thereby creating a wire bond profile;
- wherein the ball bonding, forming and terminating steps are repeated for a plurality of additional wire bonds of the integrated circuit, and at least two wire bond profiles in the integrated circuit are substantially perpendicular to one

another at a crossing point of the profiles as shown with respect to Figs 6 – 8 in paragraphs 42 – 45.

Regarding claim 16, Wang teaches the first bond site is disposed on a die 10 and the second bond site is disposed on a lead of an integrated circuit package on substrate 16 with reference to Fig. 8 in paragraph 45.

Regarding claim 17, Wang teaches the step of terminating the wire at a second bond site comprises the step of terminating the wire with a wedge bond in paragraph 9.

Regarding claim 18, Wang teaches an integrated circuit comprising:

- an integrated circuit package 10 (see Fig. 8);
- a plurality of circuit elements disposed within the integrated circuit package since the microchip inherently contains plurality of circuit elements;
- a plurality of wire bonds, wherein each of at least a subset of the wire bonds is ball bonded at a first bond site and terminated at a second bond site to create a corresponding wire bond profile, and wherein at least two of the wire bond profiles are substantially perpendicular to one another at a crossing point of the profiles as shown with reference to Figs. 6 – 8.

Regarding claims 19 and 20, Wang teaches the integrated circuit wherein the plurality of wire bonds comprise a first wire bond set and a second wire bond set, wherein wire bond profiles of the first wire bond set are interspersed with wire bond profiles of the second wire bond set, and wherein the wire bond profiles of the first wire bond set are substantially perpendicular to the wire bond profiles of the second wire

bond set at crossing points of the wire bond profiles and the plurality of wire bonds further comprises a third wire bond set and a fourth wire bond set with reference to Figs. 7 and 8 since the die 10 can have multiple bonding pads that are connected to multiple bonding pads on the substrate creating multiple wire bond sets and will cross each other perpendicularly.

Regarding claim 21, Wang teaches the integrated circuit wherein the first bond site is disposed on one of the plurality of circuit elements on a chip and the second bond site is disposed on another of the plurality of circuit elements on a substrate with reference to Fig. 8.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 2 –11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, US 2004/0124545 in view of Holdgrafer, US 5,205,463.

Regarding claims 3, 4, 8, 9, 11 and 14, Wang fails to teach using a bonding tool to apply a reverse motion containing positive and negative reverse motions for forming the bend (claims 3 and 4), clamping and moving the wire with the tool from one bond site to other bond site (claim 8), terminating the wire on a top surface of the bonding ball at the second bond site (claim 9), forming the bend to prevent skewing of the bond profile (claim 11) and terminating the wire at an angle substantially less than 90 degrees, thereby decreasing cross coupling of the wire with other wires of the integrated circuit (claim 14).

Holdgrafer teaches a method of making a constant clearance flat link fine wire interconnections with an automatic clamping tool and provide the bend in the wire bond between the two bonding sites with applying reverse motion and other limitations of these claims throughout their with respect to figures 7 – 10 for the benefit of providing

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fine wire interconnections between two bonding positions with a predetermined link geometrical profile shape in column 2, lines 60 – 65.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Wang and use a bonding tool to apply a reverse motion containing positive and negative reverse motions for forming the bend (claims 3 and 4), clamping and moving the wire with the tool from one bond site to other bond site (claim 8), terminating the wire on a top surface of the bonding ball at the second bond site (claim 9), forming the bend to prevent skewing of the bond profile (claim 11) and terminating the wire at an angle substantially less than 90 degrees, thereby decreasing cross coupling of the wire with other wires of the integrated circuit (claim 14) for the benefit of providing fine wire interconnections between two bonding positions with a predetermined link geometrical profile shape as taught by Holdgrafer in column 2, lines 60 – 65.

Regarding claims 4 – 7, Wang in view of Holdgrafer fails to teach the length of the wire at which the reverse motions are applied and the height of the wire bond profile from the first bond site.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control these parameters during the automatic bonding two bonding sites with a bonding tool through routine experimentation and optimization to achieve optimum benefits in terms of the finished wire – bonded product (see MPEP 2144.05) and it would not yield any unexpected results.

Note that the specification contains no disclosure of either the critical nature of the claimed processes or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen methods or upon another variable recited in a claim, the Applicant must show that the chosen methods or variables are critical (*Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir., 1990)). See also *In re Aller, Lacey and Hall* (10 USPQ 233 – 237).

Regarding claim 10, Wang teaches terminating the wire on a die with reference to Fig. 8.

9. Claims 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang, US 2004/0124545 in view of Miller, US 6,072,211.

Regarding these claims, Wang teaches that wide varieties of devices can be used in paragraph 48, but fails to teach a radio frequency integrated circuit, and the first bond site and the second bond site are either a die or a capacitor and vice versa.

Miller teaches that radio frequency packages, bonding wires are connected to capacitors for the benefit of reducing the effect of parasitic inductors in column 1, lines 4 – 22.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Wang and if the integrated circuit containing components for radio frequency application to be wire bonded to a capacitor from the die or vice versa for the benefit of reducing the effect of parasitic inductors as taught by Miller in column 1, lines 4 – 22.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Asok Kumar Sarkar

Asok K. Sarkar
November 7, 2005

Primary Examiner